United States Department of Agriculture | **Forest Service** | **Southwestern Region Forest Health Arizona Zone Office** | **2500 S. Pine Knoll Drive Flagstaff, AZ 86001-6381 FAX (928) 556-2130 Voice (928) 556-2073**

File Code: 3420
Date: April 25, 2005

Ken Moore
Lead Natural Resource Specialist
Grand Canyon-Parashant National Monument
345 East Riverside Drive
St. George, UT 84790

Dear Ken,

Bobbe Fitzgibbon, entomologist with the US Forest Service, Forest Health group, met with Bob Davis on Mt. Trumbull, April 7, 2005. The purpose of this visit was to evaluate the bark beetle population in and around the Nixon Administrative Center. This area is in a transition zone between the pinyõn-juniper and ponderosa pine types. Trees in such areas are at the edge of their habitat making them subject to stresses that could make them more vulnerable to insect attack. The center has been an administrative area for many years and soil compaction has occurred around a number of trees within the site. In some cases, this can predispose a tree to bark beetle attack. Many trees in the complex have been infested by bark beetles and removed from the site; however, there were previously infested trees that had not been removed. The western pine beetle (WPB), *Dendroctonus brevicomis,* was identified as the beetle attacking the ponderosa pine trees. While it generally attacks overmature trees, the pattern we have seen during the current outbreak involved trees initially infested by an *Ips* bark beetles species. The *Ips* beetles attack the upper portion of the tree with WPB attacking and filling in the lower bole. The *Ips* beetles are associated with drought conditions which have been prevalent in Arizona for the last 7-8 years. *Dendroctonus* beetles do not have as clear an association with drought; however, their populations have greatly increased by secondarily attacking *Ips* infested trees.

Western pine beetle occurs from British Columbia south to Arizona and New Mexico. Normally WPB infests overmature, windthrown, root-rotted or trees stressed by environmental conditions or events. Higher population levels allow them to attack healthier more vigorous trees of all ages. Having 2-4 generations/year in the southern portion of its range, and with females that can produce 1-3 broods, there are attacks occurring from late spring to the onset of cold weather. Pioneer beetles attack the tree at mid-bole and release an aggregation pheromone that will draw multiple beetles to mass-attack the tree, overcoming its defenses. Incoming beetles fill in the tree above and below the pioneer beetles' galleries. Reddish boring dust in the bark crevices indicates that the beetles have overcome the tree's defenses and successfully infested the tree. A female and male create adult galleries where eggs are laid in egg niches. The larvae feed on the phloem initially and then work their way into the outer bark where they complete their development, pupate and become adults that bore out of the tree and fly to another host. When beetles successfully attack a tree, they introduce blue-stain fungi that invade and clog the sapwood (Furniss and Carolin, 1977) figure 1.

Figure 1. Beetle galleries within the tree, note bluestain.

Figure 2. Previously attacked ponderosa pine.

The administrative area was surveyed for currently infested ponderosa pine trees. Several trees previously attacked by WPB were examined. Figure 2 shows a previously attacked tree located within the complex near the garage behind the cabin used by the fire crews. There were several other previously attacked trees outside of the complex but adjacent to it figure 3. Additionally, one active brood tree was found across the road from the complex. Pink and black flagging was attached to this tree. There were two trees next to the fence by the fire fighters cabins that had been infested but the larvae had died under the bark. Another tree had not faded completely but had so much woodpecker activity that the remaining bark was too dry for larval survival.

Figure 3. Currently infested with WPB.

Your management options would be:

- Monitor trees within and outside the complex for infestation, cutting and removing infested trees or otherwise destroy the brood.
- Spray high value tree with an insecticide registered for that use.
- Consider an experimental pheromone treatment on the complex.

The survey indicated that the WPB infestation has declined to the point that monitoring and removing currently infested trees would be sufficient to protect the remaining trees. We recommend that the currently infested tree marked with flagging be removed from the site prior to beetle emergence. Infested material should either be removed at least a mile from green ponderosa pine, burned or covered completely with thick clear plastic with the edges sealed

tightly. The clear plastic option is often discouraged in areas with high winds because if the seal is broken before the beetles have died, many could escape to infest green trees. Since the complex is manned all summer, the crew would be able monitor the trees in and around the camp for infestation, cutting and removing them prior to brood maturation. Some thinning of trees in the stands surrounding the complex to a BA of 80 square feet or less might be advisable to increase the overall health of the stands should the drought continue. Thinning should be done in the fall after the active bark beetle season. At this time no individual tree spraying or the use of MCH is recommended.

If you have any questions, require detailed information on treatment methods or require further assistance, please feel free to contact Bobbe Fitzgibbon at bfitzgibbon@fs.fed.us or 928-556-2072.

Sincerely,

/s/ Roberta A. Fitzgibbon (for): John Anhold
JOHN ANHOLD
Arizona Zone Leader Forest Health

cc: Aaron Wilkerson, Leonard Lucero, Debra Allen-Reid, Joel McMillin, Terry J Rogers, Bob Davis

Furniss and Carolin, 1977. Western Forest Insects; Miscellaneous Publication 1339; USDA Forest Service, Washington, DC; 654 pp.